

THE EFFECT OF CULTURAL FACTORS ON THE SCOPE/VOLUME AND STRUCTURE OF THE VOCABULARY OF DEAF AND HARD-OF-HEARING STUDENTS

UTICAJ KULTUROLOŠKIH FAKTORA NA OBIM RJEČNIKA GLUHIH I NAGLUHIH UČENIKA

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ABSTRACT

The main aim and objective of the research is to determine whether cultural factors, such as: socioeconomic status, level of education of parents, auditory status of parents and conditions of education, influence the vocabulary of deaf and hard-of-hearing students. The sample consisted of 65 hearing-impaired children of elementary school age (grades 3rd to 8th). In accordance with the objectives, hypotheses, sample and analyzed variables, the following was applied in the statistical processing of the collected data: the method of descriptive statistics, variance analysis, discriminant analysis, and regression analysis. Based on the conducted research, we have determined that the socioeconomic status, auditory status of parents, level of education of parents and conditions of education are significant cultural factors for the scope/volume and structure of the vocabulary of the hearing-impaired students.

Keywords: cultural factors, socioeconomic status, level of education, auditory status, conditions of education, vocabulary, hearing impairment

SAŽETAK

Glavni cilj istraživanja je utvrditi da li kulturološki faktori, kao što su: socioekonomski status, nivo obrazovanja roditelja, slušni status roditelja i uvjeti školovanja, utiču na obim rječnika gluhih i nagluhih učenika. Uzorak se sastojao od 65 djece oštećena sluha osnovnoškolske dobi (od 3. do 8. razreda). U skladu sa ciljevima, hipotezama, uzorkom i analiziranim varijablama, u statističkoj obradi prikupljenih podataka primjenjene su: metoda deskriptivne statistike, analiza varijance, diskriminativna analiza, te regresijska analiza. Na osnovu provedenog istraživanja, utvrdili smo da su socioekonomski status, slušni status roditelja, nivo obrazovanja roditelja i uvjeti obrazovanja značajni kulturološki faktori obima i strukture rječnika ispitanika oštećena sluha.

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Ključne riječi: kulturološki faktori, socioekonomski status, nivo obrazovanja, slušni status, uvjeti školovanja, rječnik, oštećenje sluha

INTRODUCTION

The nature of language is one of the most mysterious questions ever asked. No cultural phenomenon is so significant, but no other area offers fewer facts about its own origin than language (Zerzan, 2004). A necessary precondition for language acquisition is adequate (stimulating) communication. Understanding the meaning of isolated words is an initial element of understanding speech communication of hearing-impaired people. Being able to recognize and understand the meaning of a word means being able to associate the word with a particular object, action or property or the relationship between them. It is necessary to examine the development of vocabulary in certain time intervals and in relation to all those factors that can affect its development, since the vocabulary is the most unstable part of the language, subject to the largest and relatively rapid changes and influences (Kovačević, 2005). The level of vocabulary acquisition is one of the indicators of language skills in hearing-impaired children, although its role is very often underestimated and neglected (Zimmerman, 1997; O'Dell, 1997). The words themselves may not be very useful in communication between the hearing population and the deaf, but if words or phrases are based on the context of the conversation and the situation, they can significantly contribute to understanding (Huremović et. al., 2011). Therefore, the vocabulary is the basis for understanding what a child means by what it says and how it understands what it hears (Clark, 1985, according to Kovačević, 2000). Problems in language development are associated with socioeconomic factors and environmental deprivation, although they are not always independent of other factors, such as family or genetic factors (Reed, 2005). According to Stančić and Ljubešić (1994), socioeconomic status is not in itself a dynamic factor, but higher status gives a child more opportunities to enrich his experience. The largest lag is observed in vocabulary richness (Chall and Jacobs, 2003). Children who come from families with lower socioeconomic status tend to have a less enriched vocabulary, less experience with complicated syntax, and less general knowledge, which are skills that are key to quality comprehension from third grade onwards (Torgesen, 2004). Freeman et al. (2002) emphasize the importance of involving parents themselves in all segments of support for hearing-impaired children. Deaf and hard-of-hearing children will be able to communicate better with their family members and peers, as well as achieve greater academic achievement if their parents have been involved in the early support systems (Adams, 1990; Ogden, 1995). The auditory status of parents of a hearing-impaired child is one of the most important cultural factors (Avdić, 2015). Most deaf children grow up in a non-hearing-impaired (hearing) environment. About 90% of deaf children were born in a family with both hearing parents, 7% have one deaf parent, and only 3% have both deaf parents (Ivasović, 2002). If a deaf child is born to non-hearing-impaired (hearing) parents, the learning and use of sign language will not begin until hearing impairment is detected. Consequently, there is an initial delay in language acquisition, and the child is denied of incidental learning. Deaf children of non-hearing-impaired (hearing) parents usually learn oral-vocal language as their first language. If the hearing parents choose sign language, it is not adopted in the same way as deaf children of deaf parents. Their way of emitting and receiving sign language is different than that of deaf

parents. Non-hearing-impaired (hearing) adults usually use oral-vocal language in addition to sign language.

Such language, which follows the sentence structure of oral-voice language, is called sign language. Furth (1973, according to Pribanić 1998) states that a deaf child of non-hearing-impaired (hearing) parents has difficulty acquiring oral-vocal language because it learns it too late, in an inappropriate modality, in an unnatural way and from the wrong person. In many life situations the deaf child of non-hearing-impaired (hearing) parents will remain in ignorance and uncertainty. In contrast, deaf children of deaf parents spontaneously communicate with their parents. They accept their child spontaneously, are more relaxed in interactions, and their communication is richer because they intuitively know how to communicate with their child. They also intuitively know how to attract a child's attention, unlike non-hearing-impaired (hearing) parents who do not immediately notice the impairment, which is why even early communication is not adapted to the child. Erting (1990) concludes that deaf mothers, because of their experience in communication, adapt the show of sign language to the child, so it is much slower and simpler. They repeat one sign several times, so that the child can fully perceive it, while paying attention to facial expression. They "reward" the child's communication with positive facial emotions, and encourage it to continue communication. On the other hand, non-hearing-impaired (hearing) mothers, due to inexperience and insecurity, are more influenced by the advice of experts, while neglecting their intuition. They spend much less time interacting with the child, which leaves consequences on the child's linguistic, cognitive, social and emotional development (Pribanić, 2001). Numerous studies suggest a link between a positive family environment and many aspects of language acquisition (Zevenbergen and Whitehurst, 2003). Parental involvement in the educational process has a positive effect on the academic achievements of deaf children, as well as on language and socio-emotional development (Calderon and Greenberg, 1993; Calderon, Greenburg and Kusche, 1991). Moeller (2000) and Calderon (2000) observed better results in language achievement in children whose parents were involved in educational programs. A number of studies point to the importance of parental involvement in the education and rehabilitation process itself, creating a positive, stimulating environment for child development (Ezell, Justice and Parsons 2000; Wilcox and Corwin, 1990; Powers and Sackiewicz, 1998; Crain-Thoreson and Dale, 1999; Zevenbergen and Whitehurst, 2003; Hargrave and Senechal, 2000; Huebner, 2000; Valdez-Menchaca and Whitehurst, 1992; de Temple and Snow, 2003; Chow and McBride-Chang, 2003; Van der Lam and Timmerman, 1995; Lonigan and Whitehurst, 1998; Huremović and Sulejmanović, 2011). Michael (2003) examined the impact of family circumstances and behaviors on a child's vocabulary range and language skills in general. He found that language skills positively correlated with the level of education of parents and the number of family members. This is supported by research by Bennett (2001), who claims that a child's receptive vocabulary depends on the mother's vocabulary, mother's level of education, socioeconomic status, and the father's position / role in the family. Pan et. al. (2004) point out that these factors have a greater impact if the child lives in a rural than in an urban environment. Deaf children of deaf parents are significantly more intelligent not only than deaf children of non-hearing-impaired (hearing) parents but also than non-hearing-impaired (hearing) peers (Sisco and Anderson, 1980).

Psycholinguistic research has shown that deaf children of deaf parents adopt sign language following the same stages of development as non-hearing-impaired (hearing) children, only in a different modality (Prinz and Prinz, 1979; Marschark, 1993). Bailey et al. (1998), emphasize the importance of the method and form of education in the development of the vocabulary of a child with hearing impairment. Hearing-impaired children educated in homogeneous educational conditions achieved the worst results, compared to non-hearing-impaired (hearing) children or hearing-impaired children who are educated in heterogeneous educational conditions. Interestingly, hearing-impaired children educated in heterogeneous educational conditions achieved, on average, slightly higher scores than their non-hearing-impaired (hearing) peers in the same grades. Markides (1982, according to Pribanić, 1998), also examined whether the method of teaching a language affects the scope of vocabulary. He found that deaf people educated by the oral method achieve the same results as non-hearing-impaired (hearing) people, and that significantly worse results are achieved by the deaf people educated by the manual method. Similar data were obtained by Albertini (2002). Frisch and Pisoni (1998) conclude that better results on the Passive Vocabulary Test are achieved by hearing-impaired respondents who have a cochlear implant (CI) implanted, who were subjected to, as the authors themselves call, a “total communication program,” compared to those respondents who were subjected to an “oral communication program”. Kovačević (2005) points out, that children who have acquired a larger number of manual signs show a tendency to acquire the concepts of spoken vocabulary faster. Mokej (according to Radoman, 1996), also points to a high positive correlation between the number of gestures and the number of words in the oral vocabulary.

The main aim and objective of the research is to determine whether cultural factors, such as: socioeconomic status, level of education of parents, auditory status of parents, and conditions of education, influence the vocabulary of deaf and hard-of-hearing students. In accordance with the defined aim of the research, at the beginning of the research a hypothesis was set:

H₁ – Socioeconomic status, level of education of parents, auditory status of parents and conditions of education are significant predictors of the scope/volume of vocabulary of deaf and hard-of-hearing children.

RESEARCH METHODS

Sample of respondents

The research sample consisted of 65 respondents with hearing impairment, elementary school age. The diagnosed additional difficulties of the respondents were the eliminatory control feature of the respondents. Respondents were classified into several groups according to the following criteria: socioeconomic status, level of education of parents, auditory status of parents, and conditions of education. According to the "socioeconomic status" criteria, respondents were classified into two groups: The first group consisted of 26 respondents of unfavorable socioeconomic status, and the second group consisted of 39 respondents of favorable socioeconomic status. According to the „level of education of parents“ criteria,

respondents were classified into three groups: The first group consisted of 24 respondents whose parents have lower levels of education. The second group consisted of 39 respondents whose parents have high-school education, and the third group consisted of 2 respondents whose parents are highly educated (university degree). According to the „auditory status of parents“ criteria, respondents were classified into two groups: The first group consisted of 45 respondents whose parents are non-hearing-impaired, and the second group consisted of 20 respondents whose parents are hearing impaired. According to the „conditions of education“ criteria, respondents were classified into two groups: The first group consisted of 7 respondents who were educated in heterogeneous educational conditions, and the second group consisted of 58 respondents who were educated in homogeneous educational conditions.

Measuring instrument

To assess the scope/volume of the vocabulary, we used the Diagnostic Material for Oral Speech Examination - Vocabulary Development Examination Area (Bjelica and Posokhova, 2001). Data such as socioeconomic status, level of education of parents, auditory status of parents, and conditions of education were taken from the Anamnestic data of the respondents.

Method of conducting research

The data collection procedure was preceded by preparation, a "Research Notice" was sent to institutions where hearing-impaired children are educated, which contained information about the research itself, the research aim, method of conducting the research, and conditions necessary for conducting the research. Data collection was conducted individually. During the research examination, hearing-impaired respondents were equipped with individual hearing aids. The method of conducting the research examination was adapted to the respondents, taking into account the very nature of the impairment. Instructions for performing tasks and explanations were given orally and using sign language. The Anamnestic data is also included in the profiles of the respondents, which contains information collected through interviews or analysis of documentation.

Data processing methods

In accordance with the general aims, hypotheses, the structure of the sample of respondents and the analyzed variables, appropriate statistical procedures were applied in the statistical processing of the collected data. We used the method of descriptive statistics, i.e. the calculation of basic statistics: mean values, standard deviations, variances, standard errors, and minimum and maximum values; to examine variations between groups and within groups. Examination of the significance of variations was performed using the method of analysis of variance and discriminant analysis.

RESULTS AND DISCUSSION

A large number of hearing-impaired children, during hearing and speech rehabilitation and education, are still separated from their own family and placed in a foster care in the place of education. Given that these are preschool and school children and we know that these are the most sensitive years for the overall development of the child, we were interested in the extent to which social and economic factors affect the scope and structure of vocabulary in hearing-impaired children. According to the results of descriptive statistics, respondents with a more favorable socioeconomic status achieve better average results on all variables of the Vocabulary Development Examination Test (Table 1). This is supported by the results obtained by both Chall and Jacobs (2003, and Bennet, 2001). Pan et al. (2004), among other things, point out that the socioeconomic factor as a predictor has a greater impact if the child lives in a rural than in an urban environment. Reed (2005) points out, that problems in language development are related to socioeconomic factors and environmental deprivation, although they are not always independent of other factors, such as family or genetic factors. Stančić and Ljubešić (1994) emphasize that socioeconomic status is not in itself a dynamic factor, but higher status gives the child more opportunities to enrich its own experience.

Table 1. Descriptive statistics on the Vocabulary Development Examination Test in relation to socioeconomic status

		Maximum	Minimum	Arithmetic mean	Standard deviation	N
Unfavorable status	Nouns	199,00	6,00	74,69	52,51	26
	Adjectives	91,00	1,00	41,34	30,81	26
	Verbs	36,00	,00	10,15	10,48	26
	Adverbs	30,00	,00	9,2308	8,99	26
	Prepositions	12,00	2,00	5,19	3,60	26
	Pronouns	15,00	3,00	6,30	3,83	26
	Total	146,92			104,14	26
Favorable status	Nouns	221,00	20,00	134,92	51,89	39
	Adjectives	102,00	5,00	72,05	19,35	39
	Verbs	36,00	,00	20,54	11,33	39
	Adverbs	31,00	2,00	18,32	7,98	39
	Prepositions	12,00	2,00	7,79	3,91	39
	Pronouns	15,00	3,00	9,46	4,62	39
	Total	263,10			92,17	39

In order to examine the significance of differences in the arithmetic means of groups of respondents, classified according to socioeconomic status in relation to the results achieved on the the Vocabulary Development Examination Test, the method of variance analysis was applied. Based on the results of the analysis (Table 2), we can conclude that there is a statistically significant difference in the scope/volume of vocabulary of all word classes in the respondents in relation to the socioeconomic status of the respondents. This is supported by the results obtained by Navighurst (1971, according to Korać, 1986), who points out that socioeconomic status allows for a better and more accurate prediction of child speech performance than any other individual impact. The same author emphasizes that the impact of socioeconomic status gradually increases from 6 months to 6 years of a persons age, and that its impact gradually decreases from 6 to 25 years of a persons age. The influence of the socioeconomic factor starts increasing again in the age of 25. Such changes are most likely caused by richer social experiences with the onset of education. Thus, the child has more opportunities to create and initiate interactive relationships with the environment, which is reflected in the quantum of knowledge, which is again realized through educational achievement, and even through the scope/volume of vocabulary.

Table 2. Variance analysis on the Vocabulary Development Examination Test in relation to socioeconomic status

Source of Variance		Sum of Squares	df	Center of Square	F	sig.
Nouns	Between groups	56592,83	1	56592,83	20,81	,000
	Within groups	171274,30	63	2718,64		
Total		227867,13	64			
Adjectives	Between groups	14707,75	1	14707,75	24,40	,000
	Within groups	37969,78	63	602,69		
Total		52677,53	64			
Verbs	Between groups	1682,30	1	1682,30	13,89	,000
	Within groups	7627,07	63	121,06		
Total		9309,38	64			
Adverbs	Between groups	1285,29	1	1285,29	18,22	,000
	Within groups	4442,92	63	70,52		
Total		5728,21	64			

Prepositions	Between groups	105,66	1	105,66	7,34	,009
	Within groups	906,39	63	14,38		
	Total	1012,06	64			
Pronouns	Between groups	155,16	1	155,16	8,29	,005
	Within groups	1179,23	63	18,71		
	Total	1334,40	64			
Total	Between groups	210563,70	1	210563,70	22,33	,000
	Within groups	594025,43	63	9428,97		
	Total	804589,13	64			

The results of the regression analysis (Table 3) indicate that there is a correlation between the respondents' vocabulary development in relation to the socioeconomic status. The value of the correlation coefficient (0.572) indicates a moderate degree of correlation. Approximate results are obtained by Fraser, and later by Mollenkopf. They point out that the correlation coefficient is 0.44 and 0.31, respectively (according to Korać, 1986). The coefficient of determination (0.375) indicates that the socioeconomic status with 37.50% determines the development of the respondents' vocabulary, and the rest is the influence of other factors. We found that socioeconomic status as a predictor is significant in the model, given that test value $F(4,701)$ is higher than critical values for this degree of freedom (where numerator is 6, and denominator is 58), at both significance levels (at significance level of 5% - it is 2.25, and at significance level of 1% - it is 3.12).

Table 3. Regression analysis on the Vocabulary Development Examination Test in relation to socioeconomic status

R	R²	Corrected R²	Standard Error of the Estimate	F	df1	df2	sig. F
0,572	0,327	,258	,42540	4,701	6	58	0,001

When talking about the influence of the parental factor, especially the "level of education of parents", it is usually considered that parents with higher education have a greater amount of information related to disability, and are more willing to seek (and know where to look) different forms of support for their child's educational and rehabilitation needs. Usually, a higher level of education is associated with a higher socioeconomic status, and these types of support are more accessible to these parents.

According to the results of descriptive statistics (Table 4), the best average results on all vocabulary variables were achieved by respondents whose parents have a university degree, then respondents whose parents have a high-school education, while the worst average results on all vocabulary variables were achieved by respondents whose parents have lower levels of education.

Table 4. Descriptive statistics on the Vocabulary Development Examination Test in relation to the level of education of parents

		Arithmetic Mean	Standard Deviation	Minimum	Maximum
Lower levels of education	Nouns	79,38	43,05	6,00	153,00
	Adjectives	45,17	27,47	1,00	88,00
	Verbs	11,75	11,22	,00	34,00
	Adverbs	10,67	8,25	,00	28,00
	Prepositions	5,13	3,64	2,00	11,00
	Pronouns	6,25	3,86	3,00	13,00
	Total	158,33	88,63		
High-school education	Nouns	125,44	59,75	7,00	221,00
	Adjectives	67,03	26,02	2,00	100,00
	Verbs	18,44	11,72	1,00	36,00
	Adverbs	16,51	9,33	,00	30,00
	Prepositions	7,69	3,89	2,00	12,00
	Pronouns	9,31	4,58	3,00	15,00
	Total	244,44	110,00		
University degree	Nouns	203,50	17,68	191,00	216,00
	Adjectives	93,50	12,02	85,00	102,00
	Verbs	32,00	5,66	28,00	36,00
	Adverbs	27,00	5,66	23,00	31,00
	Prepositions	8,00	5,66	4,00	12,00
	Pronouns	10,00	7,07	5,00	15,00
	Total	374,00	53,74		

In order to examine the significance of differences in the arithmetic means of groups of respondents, classified according to the level of education of parents, the method of variance analysis was applied (Table 5). Based on the results of the analysis, we can conclude that there is a statistically significant difference in the scope/volume of vocabulary of all word classes in relation to the level of education of the respondents' parents.

Table 5. Variance analysis of the vocabulary development in relation to the level of education of parents

Source of Variance		Sum of Squares	df	Center of Square	F	sig.
Nouns	Between groups	49241,42	2	24620,71	8,54	,001
	Within groups	178625,71	62	2881,06		
	Total	227867,13	64			
Adjectives	Between groups	9446,73	2	4723,36	6,774	,002
	Within groups	43230,80	62	697,27		
	Total	52677,53	64			
Verbs	Between groups	1167,29	2	583,64	4,44	,016
	Within groups	8142,09	62	131,32		
	Total	9309,38	64			
Adverbs	Between groups	821,13	2	410,56	5,187	,008
	Within groups	4907,07	62	79,14		
	Total	5728,21	64			
Prepositions	Between groups	101,12	2	50,56	3,442	,038
	Within groups	910,93	62	14,69		
	Total	1012,06	64			
Pronouns	Between groups	145,59	2	72,79	3,797	,028
	Within groups	1188,80	62	19,17		
	Total	1334,40	64			
Total	Between groups	161248,21	2	80624,10	7,770	,001
	Within groups	643340,92	62	10376,46		
	Total					

According to the results of the regression analysis (Table 6), the value of the correlation coefficient (0.496) indicates a moderate degree of correlation between the results of the respondents and the level of education of parents. Similar results are obtained by Fraser, and later by Adžibaba-Gajanović (according to Korać, 1986). They point out that the correlation coefficient between the results of the respondents and the level of education of parents is 0.49 and 0.36, respectively. The coefficient of determination (0.246) indicates that the level of education of parents of the respondents with 24.60% determines the development of the vocabulary of the respondents, and the rest is the influence of other factors.

We found that the level of education of the respondents' parents as a predictor is significant in the model, given that the test value $F(3,160)$ is higher than critical values for this degree of freedom (where the numerator is 6, and the denominator is 58), at both significance levels (at significance level of 5% - it is 2.25, and at significance level of 1% - it is 3.12).

Table 6. Regression analysis on the Vocabulary Development Examination Test in relation to the level of education of parents

R	R²	Corrected R²	Standard Error of the Estimate	F	df1	df2	sig. F
,496	,246	,168	,49099	3,160	6	58	,009

Regarding the „auditory status of parents“, it is to be expected that deaf parents are much more sensitive to the communication needs of their deaf children, and that their communication is more extended and plentiful because they intuitively know how to communicate and how to attract the child's attention, in contrast to non-hearing-impaired (hearing) parents who do not notice the impairment, which is why even early communication is not adapted to the child. Our results suggest that the auditory status of parents is one of the more significant factors influencing the language skills of deaf children. According to the results of descriptive statistics (Table 7), respondents with hearing impairment, whose parents also have hearing impairment, achieve better average results on all vocabulary variables, compared to respondents whose parents are non-hearing-impaired.

Table 7. Descriptive statistics on the Vocabulary Development Examination Test in relation to the auditory status of parents

		Arithmetic Mean	Standard Deviation	Minimum	Maximum
Non-hearing-impaired (hearing)	Nouns	106,58	64,22	6,00	221,00
	Adjectives	56,60	31,35	1,00	102,00
	Verbs	15,00	12,84	,00	36,00
	Adverbs	13,31	10,05	,00	31,00
	Prepositions	6,22	4,28	2,00	12,00
	Pronouns	7,71	4,96	3,00	15,00
	Total	205,44	121,53		
Hearing impaired	Nouns	120,40	47,98	10,00	209,00
	Adjectives	66,90	20,47	3,00	91,00
	Verbs	19,50	9,68	2,00	36,00
	Adverbs	17,75	7,29	,00	30,00
	Prepositions	7,95	2,95	2,00	12,00
	Pronouns	9,30	3,39	3,00	15,00
	Total	241,80	84,74		
Total	Nouns	110,83	59,67	6,00	221,00
	Adjectives	59,77	28,69	1,00	102,00

	Verbs	16,38	12,06	,00	36,00
	Adverbs	14,68	9,46	,00	31,00
	Prepositions	6,75	3,98	2,00	12,00
	Pronouns	8,20	4,57	3,00	15,00
	Total	216,63	112,12		

In order to examine the significance of differences in the arithmetic means of groups of respondents, classified according to the auditory status of parents in relation to the results achieved on the Vocabulary Development Examination Test, the method of variance analysis was applied. According to the results shown in Table 8, there is no statistically significant difference in the scope/volume of vocabulary of all word classes in relation to the auditory status of parents.

Table 8. Variance analysis of the vocabulary development in relation to the auditory status of parents

Source of Variance		Sum of Squares	df	Center of Square	F	Sig.
Nouns	Between groups	2645,36	1	2645,36	,740	,393
	Within groups	225221,77	63	3574,94		
	Total	227867,13	64			
Adjectives	Between groups	1468,93	1	1468,93	1,807	,184
	Within groups	51208,60	63	812,83		
	Total	52677,53	64			
Verbs	Between groups	280,38	1	280,38	1,956	,167
	Within groups	9029,00	63	143,31		
	Total	9309,38	64			
Adverbs	Between groups	272,82	1	272,82	3,151	,081
	Within groups	5455,39	63	86,59		
	Total	5728,21	64			
Prepositions	Between groups	41,33	1	41,33	2,683	,106
	Within groups	970,72	63	15,40		
	Total	1012,06	64			
Pronouns	Between groups	34,95	1	34,956	1,695	,198
	Within groups	1299,44	63	20,62		
	Total	1334,40	64			
Total	Between groups	18300,82	1	18300,82	1,466	,230
	Within groups	786288,31	63	12480,76		
	Total	804589,13	64			

A more favorable position in the discriminatory space is achieved by respondents whose parents are also hearing impaired, as opposed to respondents with non-hearing-impaired (hearing) parents (Table 9).

Table 9. Centroids of groups on the Vocabulary Development Examination Test in relation to the auditory status of parents

	Function
Non-hearing-impaired (hearing)	-,353
Hearing impaired	,794

We explain these results by the fact that hearing-impaired children, whose parents are also hearing-impaired, possess all the experiences, knowledge and language abilities that non-hearing-impaired (hearing) children possess, because from birth they could communicate directly with their parents in their natural language - sign language. However, the experiences, cognitions and language abilities we mentioned are within the framework of another language modality - sign language. However, many studies suggest that hearing-impaired children, who have adopted sign language before adopting spoken language, have greater achievement by valuing the language skills of spoken language. Mokej (according to Radoman, 1996) indicates a high positive correlation between the number of gestures and the number of words in the oral vocabulary. Kovačević (2005) points out, that children who have learned a larger number of manual signs show a tendency to acquire the concepts of oral vocabulary faster. The value of the correlation coefficient (0.474) indicates a moderate degree of correlation between the results of the respondents and the auditory status of parents of the respondents. The coefficient of determination (0.224) indicates that the auditory status of the respondents' parents with 22.40% determines the development of the respondents' vocabulary, and the rest is the influence of other factors. The auditory status of the respondents' parents as a predictor is significant in the regression model, given that the test value F (2,797) is higher than the critical values (at significance level of 5% - it is 2.24), for the degree of freedom where the numerator is 6, and denominator is 58 (Table 10).

Table 10. Regression analysis on the Vocabulary Development Examination Test in relation to the auditory status of the parents

R	R²	Corrected R²	Standard Error of the Estimate	F	df1	df2	sig. F
,474	,224	,144	,43030	2,797	6	58	,019

When it comes to the "conditions of education" criteria, according to the results of descriptive statistics (Table 11), hearing-impaired respondents who were educated in heterogeneous educational conditions achieved better average results in all vocabulary areas/variables compared to respondents who were educated in homogeneous educational conditions. The reasons for such results can be twofold. The first reason is the remnants of hearing. Namely, the hearing-impaired respondents are mostly placed in regular educational conditions due to better hearing remnants. So, they have an advantage at the start. The second reason is that respondents who are educated in heterogeneous educational conditions are more exposed, conditionally speaking, to proper speech stimuli. They are forced to use oral speech in order to communicate with their classmates as well as with the teacher. Hearing-impaired students who are educated in homogeneous educational conditions are more familiar with the use of sign language, which is especially reflected in the scope/volume of prepositions, pronouns and adverbs; and these are the word classes that are least learned by direct teaching in the form of meaning explanation, and are more learned by direct use.

Table 11. Descriptive statistics on the Vocabulary Development Examination Test in relation to conditions of education

		Arithmetic Mean	Standard Deviation	Minimum	Maximum
Heterogeneous educational conditions	Nouns	152,28	47,89	64,00	202,00
	Adjectives	79,71	19,18	44,00	96,00
	Verbs	22,57	10,92	5,00	35,00
	Adverbs	22,14	6,28	10,00	29,00
	Prepositions	10,28	2,87	4,00	12,00
	Pronouns	12,42	3,59	5,00	15,00
	Total	299,57	85,69		
Homogeneous educational conditions	Nouns	105,82	59,32	6,00	221,00
	Adjectives	57,36	28,82	1,00	102,00
	Verbs	15,63	12,06	,00	36,00
	Adverbs	13,77	9,41	,00	31,00
	Prepositions	6,32	3,89	2,00	12,00
	Pronouns	7,68	4,42	3,00	15,00
	Total	206,62	111,33		
Total	Nouns	110,83	59,66	6,00	221,00

	Adjectives	59,76	28,68	1,00	102,00
	Verbs	16,38	12,06	,00	36,00
	Adverbs	14,67	9,46	,00	31,00
	Prepositions	6,75	3,97	2,00	12,00
	Pronouns	8,20	4,56	3,00	15,00
	Total	216,63	112,12		

In order to examine the significance of the differences in the arithmetic means of the groups of respondents, classified according to the conditions of education in relation to the results achieved on the Vocabulary Development Examination Test, the method of variance analysis was applied. Given the results of the analysis (Table 12), we conclude that there is no statistically significant difference in the scope/volume of vocabulary (nouns, adjectives and verbs) in hearing-impaired respondents in relation to the conditions of education of the respondent.

Table 12. Variance analysis of the vocabulary development in relation to the conditions of education

Source of Variance		Sum of Squares	df	Centre of Square	F	sig.
Nouns	Between groups	13481,43	1	13481,43	3,962	,051
	Within groups	214385,70	63	3402,94		
	Total	227867,13	64			
Adjectives	Between groups	3120,71	1	3120,71	3,967	,051
	Within groups	49556,82	63	786,61		
	Total	52677,53	64			
Verbs	Between groups	300,27	1	300,27	2,100	,152
	Within groups	9009,11	63	143,00		
	Total	9309,38	64			
Adverbs	Between groups	437,27	1	437,27	5,207	,026
	Within groups	5290,94	63	83,98		
	Total	5728,21	64			
Prepositions	Between groups	97,85	1	97,85	6,744	,012
	Within groups	914,20	63	14,51		

	Total	1012,06	64			
Pronouns	Between groups	140,27	1	140,27	7,400	,008
	Within groups	1194,12	63	18,95		
	Total	1334,40	64			
Total	Between groups	53965,76	1	53965,76	4,529	,037
	Within groups	750623,36	63	11914,65		
	Total	804589,13	64			

In order to determine the difference factors, the discriminant analysis was applied. The discriminant analysis produced one statistically significant discriminant function (Table 13).

Table 13. Significance of Wilks' lambda on the Vocabulary Development Examination Test in relation to the conditions of education

	Wilks' lambda	χ^2	df	sig.
1	,825	11,562	6	,042

According to the coefficients of the canonical discriminant function (Table 14), vocabulary variables "pronouns", "prepositions", and "verbs" have the largest discriminant share.

Table 14. Standardized coefficients of the canonical discriminant function on the Vocabulary Development Examination Test in relation to the conditions of education

	Function
Nouns	-,478
Adjectives	,640
Verbs	-1,202
Adverbs	,687
Prepositions	-5,046
Pronouns	6,108

The vocabularies of "prepositions", "pronouns", and "adverbs" have high correlations with the discriminant function, although other variables also have moderate correlations with the discriminant function (Table 15). These are the same areas that we have found to be particularly problematic when it comes to vocabulary adoption in conditions of hearing impairment. Children who are educated in heterogeneous educational conditions are more exposed to these word classes than children who are educated in homogeneous educational conditions. In order to communicate with their non-hearing-impaired (hearing) peers, convey information, or more successfully manipulate received information, hearing-impaired children must master all word classes. However, hearing-impaired children who are educated in homogeneous educational conditions, when living or being together, when wanting to convey

some information, use sign language when communicating with each other. Also, a teacher, who works with children who are educated in homogeneous educational conditions, uses sign language to fully convey information to a child with hearing impairment. This is reflected in the scope/volume of vocabulary of certain word classes, because they are fixed in the active vocabulary by utilization. Teaching these words alone during rehabilitation procedures is not enough.

Table 15. Structure of the matrix on the Vocabulary Development Examination Test in relation to the conditions of education

	Funtion
Pronouns	,743
Prepositions	,710
Adverbs	,624
Adjectives	,544
Nouns	,544
Verbs	,396

A more favorable position in the discriminant space is achieved by respondents who are educated in heterogeneous educational conditions, as opposed to those respondents who are educated in homogeneous educational conditions (Table 16). Similar data are obtained by Albertini (2002).

Table 16. Centroids of groups on the Vocabulary Development Examination Test in relation to the conditions of education

	Function
Heterogeneous educational conditions	1,306
Homogeneous educational conditions	-,158

According to the results of the regression analysis (Table 17), the correlation between the vocabulary development and the conditions of education of the respondents is of a moderate degree, given the value of the correlation coefficient (0.496). The coefficient of determination (0.175) indicates that the conditions of education of the respondents with 17.50% determine the vocabulary development of the respondents, and the rest is the influence of other factors. The conditions of education of the respondents did not prove to be significant as predictors, given that the test value $F(2,050)$ is less than the critical values (at significance level of 5% - it is 2.25) for the degree of freedom where the numerator is 6, and the denominator is 58, at both significance levels.

Table 17. Regression analysis on the Vocabulary Development Examination Test in relation to the conditions of education

R	R²	Corrected R²	Standard Error of the Estimate	F	df1	df2	sig. F
,418	,175	,090	,29807	2,050	6	58	,073

CONCLUSIONS

- By analyzing the scope/volume and structure in relation to the "socioeconomic status", we found that there is a statistically significant difference in the scope/volume of vocabulary of all word classes in relation to the socioeconomic status of the respondents. Socioeconomic status as a predictor had the greatest impact on the scope/volume of respondents' vocabularies of "adjectives", "nouns", and "adverbs".
- The "level of education of parents" affects the scope/volume and structure of the respondents' vocabulary. This influence is particularly pronounced in the vocabulary area of "nouns", and "adjectives", which have shown high correlations with the discriminant function.
- The "auditory status of parents" affects the scope/volume and structure of the respondents' vocabulary. Respondents with hearing impairment whose parents are also hearing impaired achieve better average scores on all vocabulary variables, compared to respondents whose parents are non-hearing-impaired (hearing).
- The "conditions of education" of hearing-impaired respondents affect the scope/volume and structure of the respondents' vocabulary. Respondents who are educated in heterogeneous educational conditions will have a larger vocabulary scope/volume of "adverbs", "prepositions", and "pronouns", as compared to respondents who are educated in homogeneous educational conditions.
- The following proved to be significant cultural factors on the scope/volume and structure of the vocabulary: socioeconomic status, auditory status of parents, level of education of parents and conditions of education.

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